PCT/JP2002/013453

Translation

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference W0793-00	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/JP2002/013453	International filing date (*day/month/year*) 24 December 2002 (24.12.2002)	Priority date (*day/month/year*) 27 December 2001 (27.12.2001)
International Patent Classification (IPC) or national classification and IPC H01M 8/02, 8/10		
Applicant HITACHI CHEMICAL COMPANY, LTD.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 12 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☒ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☒ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
19 May 2003 (19.05.2003)	12 February 2004 (12.02.2004)
Name and mailing address of the IPEA/JP Facsimile No.	Authorized officer Telephone No.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

Intern[redacted]l application No.
PCT/JP2002/013453

I. Basis of the report

1. With regard to the **elements** of the international application:*

☒ the international application as originally filed

☐ the description:

pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

☐ the claims:

pages _____, as originally filed
pages _____, as amended (together with any statement under Article 19
pages _____, filed with the demand
pages _____, filed with the letter of _____

☐ the drawings:

pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

☐ the sequence listing part of the description:

pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____
☐ the claims, Nos. _____
☐ the drawings, sheets/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.*

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IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

☐ restricted the claims.

☒ paid additional fees.

☐ paid additional fees under protest.

☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

☐ complied with.

☒ not complied with for the following reasons:

See supplemental sheet

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

☒ all parts.

☐ the parts relating to claims Nos. _____ .

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: IV. 3.

For a group of inventions set forth in the claims to fulfill the requirement of unity of invention, there must be a special technical feature linking the group of inventions so as to form a single general inventive concept, but it is clear that in the inventions set forth in claims 1-15, no common special technical feature exists between a fuel cell separator with outstanding integrity of assembly of a fuel cell stack having the constitution of claims 1-7, 9-15 and a fuel cell separator that is not likely to result in a deterioration of cell characteristics after an extended time of operation having the constitution of claim 8.

Therefore, among the group of inventions set forth in claims 1-15, there is no special technical feature linking the group of inventions so as to form a single general inventive concept. It is therefore clear that the group of inventions set forth in claims 1-15 does not fulfill the requirement of unity of invention.

Next, the number of inventions, that is, the number of inventions described in the claims of this international application and linked so as to form a general inventive concept will be examined.

Although claims 1-3, 7, 9-15, claims 4-5 and claim 6 are linked in terms of a fuel cell separator with outstanding integrity of assembly of a fuel cell stack, their technical features are mutually different ones, that is, flexural/fracture distortion, compressive modulus of elasticity and Shore hardness within specified ranges. In addition, since this feature is disclosed in prior art documents, such as document 1 (JP 8-222241 A (Tokai Carbon Co., Ltd.), 30 August 1996, Table 2,

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: IV. 3.

comparative example 3), it cannot constitute a special technical feature, and claims 1-3, 7, 9-15, claims 4-5 and claim 6 are considered to be separate inventions.

Accordingly, the claims as set forth in this international application describe four inventions classified as claims 1-3, 7, 9-15, claims 4-5, claim 6, and claim 8.

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PCT/JP 02/13453

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims		YES
	Claims	1-15	NO
Inventive step (IS)	Claims		YES
	Claims	1-15	NO
Industrial applicability (IA)	Claims	1-15	YES
	Claims		NO

2. Citations and explanations

Document 1: JP 2000-100453 A (Hitachi Chemical Co., Ltd.), 7 April 2000 (Family: None)

Document 2: JP 2000-82476 A (Hitachi Chemical Co., Ltd.), 21 March 2000 (Family: None)

Document 3: JP 2000-182630 A (Nisshinbo Industries, Inc.), 30 June 2000 & EP 1011164 A2 & US 2002/0068210 A1

Document 4: JP 2001-189159 A (Nisshinbo Industries, Inc.), 10 July 2001 & EP 1094534 A2

Document 5: JP 2001-106831 A (Sumitomo Bakelite Co., Ltd.), 17 April 2001 (Family: None)

Document 6: JP 8-222241 A (Tokai Carbon Co., Ltd.), 30 August 1996 (Family: None)

Document 7: JP 2000-348740 A (Ibiden Co., Ltd.), 15 December 2000 (Family: None)

Document 8: JP 11-354136 A (Hitachi Chemical Co., Ltd.), 24 December 1999 (Family: None)

The invention set forth in claims 1 to 7 and 9 to 15 lacks novelty and does not involve an inventive step in the light of document 1 cited in the international search report.

Document 1 indicates that exfoliated graphite powder

is pressed into a sheet using a roller, and the sheet thus obtained is crushed to obtain exfoliated graphite powder; and that the exfoliated graphite powder obtained is mixed with resin and molded using a molding die for fuel cells.

The fuel cell separator and its raw materials in the invention set forth in document 1 correspond to those set forth in claims 1 to 7 and 9 to 15, and the manufacturing method is similar, therefore it is understood that the flexural/fracture distortion, modulus of compressive elasticity and Shore hardness in the invention set forth in document 1 overlap with the range set forth in claims 1 to 6 in some cases.

The invention set forth in claim 8 lacks novelty and does not involve an inventive step in the light of document 1.

Document 1 indicates that exfoliated graphite powder is rinsed with water or heat-treated, and that a pad made from enamel is used (paragraph [0036]).

The fuel cell separator set forth in claim 8 and its method of manufacture are similar to those described in the invention set forth in document 1,, therefore it is understood that the total concentration of elutriated sodium, potassium, iron, nickel and magnesium in the immersion water, and the concentration of sulfur overlap with the range set forth in claim 8 in some cases.

The invention set forth in claims 1 to 7 and 9 to 15 lacks novelty and does not involve an inventive step in the light of document 2 cited in the international search report.

Document 2 indicates that exfoliated graphite powder is pressed into a sheet using a roller, and the sheet thus

obtained is crushed to obtain exfoliated graphite powder; and that the exfoliated graphite powder obtained is mixed with resin and a fibrous substance and molded using a molding die for fuel cells.

The fuel cell separator and the manufacturing method thereof set forth in claims 1 to 7 and 9 to 15 are similar to those described in document 1, and the manufacturing method is similar, therefore the flexural/fracture distortion, modulus of compressive elasticity and Shore hardness in the invention set forth in document 2 is understood to overlap with the range set forth in claims 1 to 6 in some cases.

The invention set forth in claims 1 to 7, 9 to 10 and 12 to 15 lacks novelty and does not involve an inventive step in the light of document 3 cited in the international search report.

Document 3 indicates that it is possible to obtain a high-strength, extremely tough fuel cell separator, and that the amount of deflection in bending is 0.5mm or more, bending strength falls within the range of 4 to 15kgf/mm^2, and the bending modulus of elasticity falls within the range of 2000 to 6000kgf/mm2 (paragraph [0036]).

It is understood that the flexural/fracture distortion, modulus of compressive elasticity and Shore hardness in the invention set forth in document 3 overlap with the range set forth in claims 1 to 6 in some cases.

The invention set forth in claim 11 does not involve an inventive step in the light of document 3 cited in the international search report.

Document 3 sets forth exfoliated graphite and the like as powdered carbon filler (paragraph [0019]), but the

use of powder obtained by crushing exfoliated graphite sheet as exfoliated graphite is known as set forth in documents 1 and 2, therefore it would be easy for a person skilled in the art to use powder obtained by crushing exfoliated graphite sheet as exfoliated graphite in the invention set forth in document 3.

The invention set forth in claims 1 to 7, 9 and 12 to 15 lacks novelty and does not involve an inventive step in the light of document 4.

Document 4 indicates that it is possible to obtain a fuel cell separator with a high bending strength and a low degree of bending elasticity (with a high amount of distortion) (paragraphs [0008] to [0009]).

It is understood that the flexural/fracture distortion, modulus of compressive elasticity and Shore hardness in the invention set forth in document 4 overlap with the range set forth in claims 1 to 6 in some cases.

The invention set forth in claims 1 to 7, 9 and 12 to 15 lacks novelty and does not involve an inventive step in the light of document 5 cited in the international search report.

Document 5 sets forth a conductive molded body having specific values for bending strength and amount of deflection in bending (paragraphs [0012] to [0015]).

It is understood that the flexural/fracture distortion, modulus of compressive elasticity and Shore hardness of the invention set forth in document 5 overlap with the range set forth in claims 1 to 6 in some cases.

The invention set forth in claims 6 to 7, 9 and 12 to 15 lacks novelty and does not involve an inventive step

in the light of document 6 cited in the international search report.

Document 6 sets forth a graphite member having a Shore hardness of 40 and used as a fuel cell separator or the like ([Table 2]).

The invention set forth in claims 8 to 9 and 12 to 15 lacks novelty and does not involve an inventive step in the light of document 7 cited in the international search report.

Document 7 sets forth a fuel cell separator having a concentration of impurities contained within a resin molded body of 100ppm or less. Document 7 also indicates that carbon powder is treated with halogens while being heated, and sets forth sodium, potassium, iron, nickel, magnesium and the like as impurities (paragraph [0026]).

In the invention set forth in document 7, it is understood that if sulfur is contained as an impurity, its concentration would be reduced.

The invention set forth in claims 10 to 11 does not involve an inventive step in the light of documents 7, 1 and 2 cited in the international search report.

The use of powder obtained by crushing exfoliated graphite sheet as the carbon powder used in fuel cell separators is known, as indicated in documents 1 and 2, and it would be easy for a person skilled in the art to use powder obtained by crushing exfoliated graphite sheet as the carbon powder in the invention set forth in document 7.

The invention set forth in claims 1 to 7 and 9 to 15

lacks novelty and does not involve an inventive step in the light of document 8 newly cited in the written opinion.

Document 8 indicates that exfoliated graphite powder is pressed into a sheet using a roller, and the sheet thus obtained is crushed to obtain exfoliated graphite powder; and that the exfoliated graphite powder obtained is mixed with resin and molded using a molding die for fuel cells.

The fuel cell separator and its raw materials in the invention set forth in document 8 correspond to those set forth in claims 1 to 7 and 9 to 15, and the manufacturing method is similar, therefore it is understood that the flexural/fracture distortion, modulus of compressive elasticity and Shore hardness in the invention set forth in document 8 overlap with the range set forth in claims 1 to 6 in some cases.

VI. Certain documents cited

1. Certain published documents (Rule 70.10)

Application No. Patent No.	Publication date *(day/month/year)*	Filing date *(day/month/year)*	Priority date (valid claim) *(day/month/year)*
JP 2002-184420 A [E, X]	28 June 2002 (28.06.2002)	03 October 2001 (03.10.2001)	03 October 2000 (03.10.2000)
JP 2002-198063 A [E, X]	12 July 2002 (12.07.2002)	15 October 2001 (15.10.2001)	18 October 2000 (18.10.2000)

2. Non-written disclosures (Rule 70.9)

Kind of non-written disclosure	Date of non-written disclosure *(day/month/year)*	Date of written disclosure referring to non-written disclosure *(day/month/year)*